

STUDIES IN STREPTOCARPUS

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ABSTRACT

A brief account is given of the habitat, habit, and floral morphology of *Streptocarpus* in South Africa, and a more natural grouping than the present subdivision into *Unifoliati* and *Rosulati* is outlined. Attention is drawn to the prevalence of natural interspecific hybridisation and its obvious and inferred effect upon morphological variation. The taxonomy of *S. polyanthus* and its allies is dealt with.

The subgenus Streptocarpus in South East Africa

Streptocarpus is divided into two subgenera. Subgenus *Streptocarpus* extends from Tropical Africa southwards to the eastern Cape, while subgenus *Streptocarpella*, widespread in Tropical Africa, is unrecorded south of Malawi. Only the south eastern representatives of *Streptocarpus* will be dealt with in these studies.

The last account of *Streptocarpus* in South Africa was that of Clarke (1904). Since then a number of new species have been described and much comment made on existing species. Clarke's work was based largely on herbarium material and his, and subsequent, descriptions were often inaccurate and inadequate. Determination of specimens was thus difficult and application of names doubtful.

An attempt was therefore made to solve the taxonomic problems relating to the Natal taxa as these were, to me, the most pressing. It soon became apparent that many species are extremely variable. As work progressed, patterns of affinity between the species began to emerge. It eventually proved possible to divide the subgenus into one or two isolated species and a number of groups of closely related taxa, each group delimited by clearcut diagnostic characters and sometimes possessing a distinctive facies.

It is proposed to publish a series of papers containing descriptions of and keys to some of the species, and in addition, their synonymy and literature, and such discussion on variation, interspecific hybridisation, habit, habitat and distribution, as seems necessary to clarify immediate taxonomic problems. The purpose of the series will be to facilitate correct application of existing

names, and to provide accurate, detailed and uniform descriptions of both "old" and "new" species.

I have seen all cited specimens. In addition to the herbarium abbreviations of Lanjouw and Stafleu (1964), SGH denotes Swaziland Government Herbarium, Mbabane, Swaziland.

An asterisk against a literature reference indicates an illustration accompanying the text.

HABITAT

The subgenus is not confined to shady wooded kloofs at high altitudes as is popularly supposed (cf. Lawrence 1940, 1958). Preferences are for partial shade with moisture from rain, seepage or mist. These requirements are fulfilled not only by forest conditions but also by cliffs, escarpments and rock outcrops, generally those orientated south west to south east, which face the rainbearing winds and are partially shaded during the day. Such rock habitats abound in eastern South Africa, and together with forest and forest patches are found throughout the area from almost sea level to about 2,300 m. Above this altitude, climatic conditions are possibly unsuitable for *Streptocarpus*.

Some species are restricted to forest, some to rock habitats, and a few are able to adapt themselves to both. Even in forest, habitat preference is for rock outcrops, cliffs, and steep earth banks. Many forest species may grow epiphytically; some are invariably epiphytic or lithophytic. Good drainage is probably a critical factor, since species otherwise difficult to cultivate grow well in hanging baskets.

Factors governing geographical distribution are obscure. Altitude with its effect upon climate appears to be of significance in some instances, for example *S. pentherianus* Fritsch grows at altitudes generally greater than 1,200 m and ranges along the Drakensberg, its foothills and outliers from the Cape-Natal border to the south eastern Transvaal and Swaziland. *S. pusillus* Harv. ex C.B.Cl. occurs above about 1,675 m on the Cave Sandstone of the Drakensberg in Natal, Basutoland and Orange Free State and at slightly lower altitudes in the eastern Cape. *S. fanniniae* Harv. ex C.B.Cl. is found only above 900 m in the Mistbelt forests of Natal. On the other hand, *S. gardeni* Hook. grows in forested areas from the eastern Cape to northern Natal from the Drakensberg virtually to the coast.

HABIT

In *Streptocarpus* the embryo, consisting of two cotyledons, a hypocotyl and a radicle, has no plumular bud. Shortly after germination, one cotyledon aborts, and the other proliferates from a basal meristem to produce a foliaceous organ here referred to as a "leaf". The hypocotyl may or may not form a conspicuous stalk to the leaf. The radicle is replaced by a fibrous root system.

The vegetative plant may consist of only this solitary leaf with its fibrous roots. Inflorescences develop in acropetal succession from the upper surface of the leaf at the base of the midrib. After flowering and fruiting, the whole plant dies. Species exhibiting this growth form are monocarpic.

In other species, however, one or several accessory leaves develop from the meristem, generally opposite the primary leaf, from which they are indistinguishable. Usually, each leaf is monocarpic, and is succeeded by other accessory leaves. Occasionally a leaf may persist for two seasons, shown by the presence of old infructescences adjacent to new flowering peduncles. Species exhibiting this growth form are perennial (polycarpic).

In still other species, however, the cotyledonary leaf elongates and becomes petiolate. The petiole is often curved at the base, producing adventitious roots where it touches the ground. Other petiolate leaves develop near the base of the first petiole, and in this way a loose association of petiolate, rooting leaves is built up—the so-called rosette, in which each individual leaf is monocarpic,

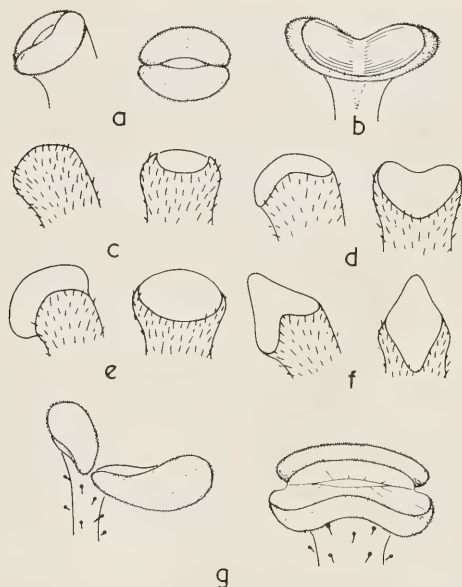


FIG. 1. Stigma forms in the subgenus *Streptocarpus*. a. Stomatomorphic, papillose stigma viewed from the side and from above. b. Stigma of two equal, lingulate, papillose lips. c—e. Truncate to subcapitate stigmas, side and front views. f. Conical stigma, side and front views. g. Stigma of two unequal, reniform, papillose lips, side and front views.

but the plant is perennial. Britten (1940) reported that some strains of the rosulate *S. rexii* (Lindl.) Hook. and *S. johannis* L. L. Britten increase vegetatively by the adventitious sprouting of leaves from roots. *S. cyaneus* S. Moore and *S. primulifolius* Gandoger, also rosulate, habitually develop a rhizomatous organ about a centimetre in diameter, sometimes branched, and attaining a length of several centimetres. This "rhizome" has numerous leaf scars and bears a tuft of leaves at its apex. Rhizome development is possibly correlated with habitat; this organ is developed in species favouring rock faces.

The distinction between monocarpic (one-leaved) and perennial (several-leaved) plants is not absolute. Lawrence (1958), in commenting on the work of Oehlkers (1938, 1942) made the observation "[it appears] as if two dominant supplementary genes controlled the rosulate character, the double recessive being unifoliate. Clearly, if modifiers affect either or both of the recessive genes, or if they differ in their degree of recessiveness, the possibility exists of unifoliate . . . producing a second leaf of sorts."

This is borne out by field observations. In solitary-leaved and therefore monocarpic species, the meristem occasionally gives rise to a foliaceous bract resembling an accessory leaf. This may or may not produce small peduncles, the whole plant dying after flowering.

In *S. pusillus*, one, sometimes two, petiolate flowering leaves are often produced opposite the primary leaf but the plant is monocarpic. *S. davyi* S. Moore has the same growth form, but accessory leaves also arise at the base of the primary petiole and the plant is perennial. Other species (e.g. *S. dunnii* Hook. f. and *S. galpini* Hook. f.) are often unifoliate, but sometimes produce several leaves. That they are perennial is doubtful, because of the absence of old leaf and peduncle remains evident in the true perennials. The problem of whether solitary-leaved taxa are always monocarpic and several-leaved taxa always perennial, needs further investigation.

A similar problem arises if the meristem is damaged and proliferation occurs. The plant may survive for more than one season but is not truly perennial.

DIAGNOSTIC CRITERIA

In some species, morphological variation is pronounced, consequently the recognition of species limits is not always easy. An appreciation of variation patterns was arrived at only after sampling numerous populations. In some variable species, this led to the recognition of infra-specific taxa, but in others no such subdivision was possible.*

* The sampling method used was to select flowers of similar age, one from each of twenty plants within a population, at intervals determined by population extent. The corollas were photographed against a centimetre scale, then pressed. The pressed specimens and photographs are preserved at NU.

Most of the population sampling was done in Natal, because field work in the Cape, Transvaal and Swaziland was of necessity limited.

Some of this variation can be attributed to response of the individual to fluctuations in water supply inherent in the habitats favoured by *Streptocarpus*. Water scarcity during growth results in smaller leaves and flowers and depauperate inflorescences. This may be seen in plants growing only a foot or so apart when, for various reasons, some are well supplied with water and others are not. Reduction in size under adverse conditions occurs in all species. For this reason, absolute leaf and flower size are misleading diagnostic characters, unless the range of size variation is known and is used in conjunction with other characters.

Apart from size variation, individuals growing together tend to resemble one another closely. Careful investigation will reveal slight differences in shape and depth of colour of corolla lobes, in degree of yellowing in the throat, and in patterning on the limb, but the individuals look similar, and the term "population" is used for such a group.

It is morphological variation *between* populations that can lead to confusion in circumscribing taxa. Some species e.g., *S. pentherianus* and *S. gardeni*, both relatively wide-ranging, show very little variation, while others, e.g. *S. haygarthii* N.E.Br. ex C.B.Cl. and *S. cyaneus*, are very variable in size and in colour and markings of their flowers, and also to some extent in shape of corolla lobes. The most reliable taxonomic characters are shape of corolla tube and limb. This is well illustrated in *S. haygarthii* where the shape of the limb remains constant in an otherwise bewildering array of size and colour forms.

Corolla colour in the subgenus ranges from white to violet, except that in *S. dunnii* it is red, while pinkish tones are usual in some populations of *S. cyaneus*, *S. grandis* N.E.Br. and *S. galpini*, and occasional in other species. Albinism is occasional. Corolla colour and markings can be of use in delimiting species, usually only if used in conjunction with other characters.

The filament sometimes has an appendage at its juncture with the connective. This appendage may be a conspicuous tooth visible to the naked eye, or a small "hump" seen only with the aid of a lens.

Leaf number, indumentum and colour (particularly of the under-surface), the presence or absence of a distinct hypocotyl in the monocarpic species, type of indumentum on various organs, the presence or absence of a palatal beard in the corolla tube, number of flowers per peduncle, point of attachment of the filaments in the corolla tube, the anther appendages described above, and capsule dimensions are all useful characters, although their reliability may vary from species to species.

Fritsch (1893) followed by Clarke (1904), used leaf number to delimit sections of the subgenus, which character was reflected in their epithets *Unifoliati* and *Rosulati*. Burt (1939) pointed out that there is no hard and fast

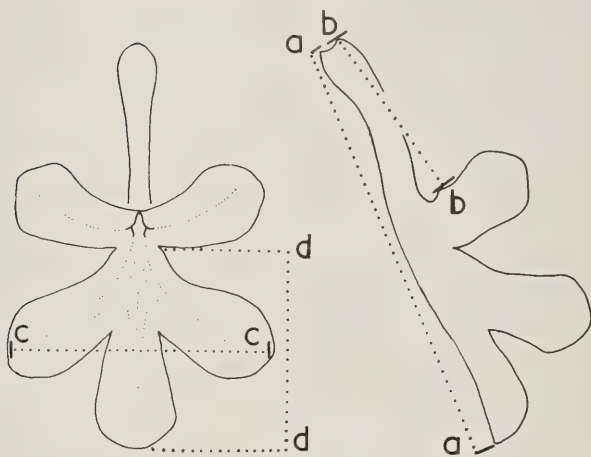


FIG. 2. Diagram of a corolla with "waisted" limb as in *S. haygarthii*. Points of measurement a—a length of flower; b—b length of corolla tube; c—c width of lower lip; d—d length of lower lip.

line between *Unifoliati* and *Rosulati*, and suggested a more satisfactory subdivision could be made if the character of rosulate or unifoliate habit were relegated to a position of secondary importance. This opinion is amply supported by field observations. A much truer picture of the natural affinities of the species is probably obtained by considering corolla shape in conjunction with the ratio of style length to ovary length and the form of style and stigma.

The corolla is bilabiate and the limb may be more conspicuous than the tube or *vice versa*. When the limb is the more conspicuous, the tube is narrow in relation to its length, bent abruptly downward and then projected forward, and is laterally compressed in the mouth (*S. polyanthus* Hook.). When the tube is the more conspicuous, it is generally broad in relation to its length, may be curved (*S. vandeleurii* Bak. f. et S. Moore) or almost straight (*S. fanniniae*) and is always cylindric in the mouth. The tube may, however, be infundibuliform with a conspicuous limb (*S. rexii*).

The style may be longer than, or shorter than, or roughly equal in length to, the ovary. The base of the style tends to persist as an apiculus on the mature capsule. Depending on initial style length and ultimate capsule length, this apiculus may or may not be prominent. It is inconspicuous on both short and long capsules where the style was shorter than the ovary. It is prominent on short capsules where the style was longer than or roughly equal in length

to the ovary. There is good correlation between mean pistil length and mean capsule length (Lawrence, 1958). The ratio of style length to ovary length is therefore an indication of ultimate capsule size and the degree of prominence of the persistent style base.

The style may be terete, or dorso-ventrally compressed, or sometimes terete and slightly dorso-ventrally compressed apically. The stigma assumes several different forms. It may be truncate to subcapitate, sometimes jelly-like, sometimes papillose; it may be stomatomorphic and papillose; or be composed of two unequal, reniform papillose lips in the median plane; or of two equal, lingulate, papillose lips held either laterally or in the median plane (Fig. 1). The merit of the stigma as a diagnostic character was arrived at independently of Burt's (1954) observations on the possible taxonomic value of the stigma in the family as a whole, and lends support to them.

Because there is correlation among them, these gynoecial characters, in conjunction with corolla shape, are used in this series to delimit groups of species.

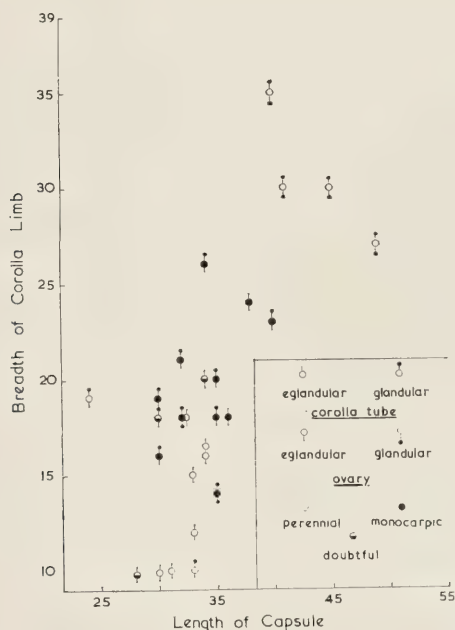


FIG. 3. Pictorialised scatter diagram illustrating continuous variation in breadth of corolla limb, length of capsule, indumentum on corolla tube and ovary, and habit in *S. polyanthus*. (All measurements in mm.)

Species with a narrow corolla tube compressed in the mouth have a terete style much shorter than the ovary, and either a short or long capsule on which the persistent style base is inconspicuous. The stigma may be truncate to subcapitate, sometimes with incipient bilobing, and it is jelly-like or papillose (*S. polyanthus*). The only exception is *S. johannis* in which the stigma is always bilobed and papillose with the lobes held laterally. Lawrence (1958) considered this species, which is aberrant in several other respects, to be of hybrid origin.

In another group, a subcylindric, cylindric or narrowly infundibuliform corolla tube, long in relation to its width, is associated with a terete style, sometimes slightly dorso-ventrally compressed apically, shorter than the ovary, and terminating in a stomatomorphic, papillose stigma. The capsule is long and the persistent style base is inconspicuous (*S. grandis*).

In a third group, the tube may be cylindric to almost campanulate, straight or bent, broad or narrow in relation to its length, the style terete, equalling the ovary in length, and terminated by a stomatomorphic, papillose stigma. The capsule is relatively short and stout with a conspicuous apiculus (*S. cooksonii* B. L. Burt).

Again, a cylindric, almost straight, relatively small, short and broad corolla tube may be associated with a terete style slightly longer than the ovary and terminated by a stomatomorphic, papillose stigma, sometimes ill-developed and appearing truncate. The capsule is short and stout with a conspicuous apiculus (*S. micranthus* C.B.C1.).

Finally, the style may be markedly dorso-ventrally compressed, terminating in a stigma composed of two unequal, reniform, papillose lips in the median plane. If the style is shorter than the ovary, it is always associated with an infundibuliform corolla with a conspicuous limb, and the mature capsule is long with an inconspicuous apiculus (*S. rexii*). If the ratio of style length to ovary length is roughly equal, the corolla tube is almost cylindric, straight or slightly curved, relatively short and broad, and the limb generally less conspicuous than the tube. The capsule is relatively short with a prominent apiculus (*S. fanniniae*).

In addition to *S. johannis*, there are three other species which do not fit into any of these categories. *S. baudertii* L. L. Britten is morphologically very similar to *S. johannis*, but the stigma lobes are held in the median plane, and the leaves are prostrate rather than erect.

S. dunnii has a subcylindric corolla tube associated with a terete style slightly dorso-ventrally compressed apically, much longer than the ovary and terminated by a papillose, stomatomorphic stigma. The capsule is short and apiculate. *S. pole-evansii* Verdoorn has a cylindric, bent corolla tube associated with a dorso-ventrally compressed and sometimes coiled style, longer than the ovary,

and a papillose, stomatomorphic stigma. The capsule is short and apiculate. *S. dunnii*, *S. pole-evansii* and *S. denticulatus* Turrill share the distinction of producing red pigment granules over most of the epidermis.

Fig. 2 illustrates points of measurement and terminology used for the flower. The anther lobe was measured along the line of dehiscence. In most descriptions, limits of capsule length are given, followed in parenthesis by the mean and standard deviation from the mean, based on not less than twenty, generally more than fifty, measurements.

HYBRIDISATION

All the species in subgenus *Streptocarpus* so far investigated (Lawrence et al. 1939) have the same chromosome number and artificial hybridisation has produced the well known fertile garden hybrids. Lawrence (1958) concluded that "the high genic variability that characterises this outbreeding genus . . . is the outcome of a degree of hybridisation", basing his conclusions largely on his own experimental work on the genetics of the genus, because nothing was then known about natural interspecific hybridisation.

Recent field studies have shown that natural interspecific hybridisation is frequent in *Streptocarpus*, yet many species are sympatric but remain distinct. The isolating mechanisms keeping the species separate in nature are obscure, but probably a preference for different habitats is important.

In a stable environment, the delicate balance between well-adapted species and their habitat is maintained, and although crossing may take place, only an occasional inter-specific hybrid survives. Such solitary hybrids are frequently seen in sympatric species populations. But the F_1 hybrids of a cross between species reproductively isolated by only an ecological barrier are fully fertile (Stebbins, 1949). In disturbed habitats, one would therefore expect to find hybrid swarms. Examples of hybridisation associated with human activity are seen particularly where roads have been cut through forest patches on steep terrain, creating rock faces adjacent to forest, and are discussed in relation to *S. haygarthii* in particular.

Hybridisation in *Streptocarpus* is not necessarily a recent phenomenon. There is little doubt that forests were in the past much more extensive in South East Africa than they are at present (cf. Fourcade, 1889). The topography is such that thousands of forest patches survive on escarpments, in the folds of hills, and in kloofs. In some of these occur problematical populations which cannot with certainty be referred to any described species, because, while the individuals closely resemble one another, the population as a whole combines the characteristics of two different species, species not necessarily still growing in the area. These populations are extremely interesting because of their possible hybrid origin. As they exist only as single isolated populations it would serve

no useful purpose to give them taxonomic recognition. They are described in the appropriate context as anomalous populations of possible hybrid origin in need of further study and their occurrence has not been permitted to blur the distinctness of the parent species.

THE *S. POLYANTHUS* ALLIANCE

S. polyanthus and its allies form a morphologically distinct group delimited by certain correlated diagnostic criteria. The corolla tube is narrowly cylindric, bent abruptly downward and then projected forward, and is laterally compressed in the mouth. The flat, oblique limb, more conspicuous than the tube, gives a distinctive facies to the group as a whole. The terete style is shorter than the ovary and is terminated by a truncate to subcapitate or conical stigma, sometimes with incipient bilobing, translucent and jelly-like, or papillose.

Although the alliance is readily diagnosed, its species are perhaps the most intractable, taxonomically, within the whole subgenus, owing to pronounced variation within and, in particular, between populations.

Seven species including four subspecies constitute the *S. polyanthus* alliance, of which two species and two subspecies are here described as new. *S. daviesii*, *S. pentherianus*, *S. silvaticus* and *S. polyanthus* ssp. *comptonii*, *verecundus* and *dracomontanus* show relatively little variation, *S. polyanthus* ssp. *polyanthus* and *S. prolixus* show some variation, *S. confusus* and particularly *S. haygarthii* are extremely variable. Variation is discussed after the description of each species.

The centre of distribution of the group is Natal, which is not a geographically circumscribed area. Although some species have a very limited distribution within the province, others extend southwards into the eastern Cape and northwards into Swaziland and the eastern Transvaal. At least one Tropical African species, *S. compressus* from Tanganyika, has a compressed throat, but may not be closely allied to this group. Distribution is indicated after each species description, together with maps.

General Characteristics of *S. polyanthus* Alliance

Stemless herbs, monocarpic or perennial, terrestrial or epiphytic. *Leaves* 1—5, pilose, base cordate, apex usually withered, margin crenate, upper surface rugulose, veins impressed, veins prominent below. *Inflorescences* several in succession usually from upper surface near base of midrib, cymose. *Calyx* 5-partite, (campanulate and 5-lobed in *S. daviesii*). *Corolla* bilabiate, tube narrowly subcylindric, bent sharply downwards, then projected forwards,

narrowing towards middle, widening slightly at mouth, *mouth laterally compressed*, base bulbous; limb $\pm$ oblique, more conspicuous than tube; upper lip 2-lobed, lower 3-lobed. Fertile *Stamens* 2, epipetalous, inserted halfway up corolla tube; anthers introrse, applanate; staminodes 3. *Disc* annular. *Ovary* terete; *style terete*, shorter than ovary, pubescent; *stigma truncate to subcapitate or conical*, translucent, occasionally papillose. *Capsule* of 2 spirally twisted valves.

KEY TO SPECIES

- | | |
|---|---------------------------|
| 1a. Calyx campanulate, lobes deltoid | (4) <i>S. daviesii</i> |
| 1b. Calyx 5-partite, lobes linear to lanceolate | 2. |
| 2a. Plant with one leaf only; capsule usually 45—90 mm. long | 3. |
| 2b. Plant with two or more leaves; if one leaf only, capsule less than 45 mm. long. | 4. |
| 3a. Primary peduncle originating from upper surface of leaf at base of midrib; corolla limb roundish to elongate, "waisted"; if "waist" obscure, mouth of corolla tube and point of divergence of two upper lobes not contiguous. | (7) <i>S. haygarthii</i> |
| 3b. Primary peduncle often originating from apex of hypocotyl and curling up through leaf sinus; corolla limb oblong, not "waisted"; mouth of corolla tube and point of divergence of two upper lobes always contiguous. | (6) <i>S. confusus</i> |
| 4a. Corolla always under 20 mm. long, ovary 2 mm., capsule up to 20 mm., often shorter than pedicel. | (5) <i>S. penterianus</i> |
| 4b. Corolla usually over 20 mm. long, ovary at least 3 mm., capsule generally longer than 20 mm., always longer than pedicel unless the stigma is conical. | 5. |
| 5a. Stigma conical, pedicel sometimes longer than capsule, plants epiphytic or on rocks in forest. | (3) <i>S. silvaticus</i> |
| 5b. Stigma subcapitate to truncate, sometimes obscurely bilobed, but never conical; plants in crevices of cliffs or rock outcrops, sometimes on cliffs at upper limits of escarpment forest. | 6. |
| 6a. Limb slightly "waisted", capsule c. 1.5 mm. in diameter. | (2) <i>S. prolixus</i> |
| 6b. Limb rounded, capsule 2—2.5 mm. in diameter | (1) <i>S. polyanthus</i> |

ALTERNATIVE KEY TO SPECIES AND ANOMALOUS POPULATIONS

- | | |
|---|--------------------------------------|
| 1a. Calyx campanulate, lobes deltoid. | (4) <i>S. daviesii</i> |
| 1b. Calyx 5-partite, lobes linear to lanceolate. | 2. |
| 2a. Stigma conical. | 3. |
| 2b. Stigma subcapitate to truncate, sometimes obscurely bilobed, but never conical. | 4. |
| 3a. Leaves several, inflorescence up to 10-flowered. | (3) <i>S. silvaticus</i> |
| 3b. Leaf one, inflorescence many-flowered. | (7) Anomalous population "The Start" |
| 4a. Leaf one; capsule usually 45—90 mm. long. | 5. |
| 4b. Leaves two or more; if one only, capsule less than 45 mm. long. | 6. |
| 5a. Primary peduncle originating from upper surface of leaf at base of midrib; corolla limb roundish to elongate, "waisted"; if waist obscure, mouth of corolla tube and point of divergence of two upper lobes not contiguous. | (7) <i>S. haygarthii</i> |

- 5b. Primary peduncle often originating from apex of hypocotyl and curling up through leaf sinus; corolla limb oblong, not "waisted"; mouth of corolla tube and point of divergence of two upper lobes always contiguous.
- 6a. Corolla always under 20 mm. long, ovary 2 mm., capsule up to 20 mm., often shorter than pedicel.
- 6b. Corolla usually over 20 mm. long, ovary at least 3 mm., capsule generally over 20 mm., always longer than pedicel
- 7a. Limb rounded; capsule 2—2.5 mm. in diameter.
- 7b. Limb rounded or "waisted"; capsule c. 1.5 mm. in diameter.
- 8a. Limb rounded; leaves subequal in length, suberect.
- 8b. Limb slightly "waisted"; accessory leaves generally appreciably smaller than flowering leaf, leaves prostrate.
- (6) *S. confusus*
- (5) *S. penterianus*
7. (1) *S. polyanthus*
8. (2) Anomalous population Kingscliffe
- (2) *S. proluxus*

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(Synonyms in italics)

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<i>confusus</i> × <i>polyanthus</i>	39	<i>polyanthus</i> ssp. <i>dracomontanus</i>	16, 18
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<i>cyaneus</i>	3, 5	<i>polyanthus</i> ssp. <i>verecundus</i>	15, 18
<i>daviesii</i>	25	<i>polyanthus</i> × <i>confusus</i>	39
<i>daviesii</i> × <i>haygarthii</i>	27	<i>polyanthus</i> × <i>haygarthii</i>	20, 37, 38, 40
<i>davyi</i>	4	<i>polyanthus</i> × <i>prolixus</i>	19
<i>denticulatus</i>	8	(<i>polyanthus</i> × <i>prolixus</i>)	22
<i>dunnii</i>	4, 5, 8	(<i>polyanthus</i> × <i>silvaticus</i>)	
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<i>gracilis</i>	20	<i>prolixus</i> × <i>polyanthus</i>	19
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<i>grandis</i> × <i>confusus</i>	34	<i>rexii</i>	3, 6, 8
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<i>haygarthii</i> × <i>daviesii</i>	27	<i>vandeleurii</i>	6
<i>haygarthii</i> × <i>polyanthus</i>	20, 37, 38, 40		

1. *Streptocarpus polyanthus* Hook. in Bot. Mag. t. 4850 (1855)*, Bot. Mag. t. 4850, of which no specimen was preserved, HOLOTYPE.

Leaves 1—3, prostrate, up to 240 × 170 mm., upper surface light green, sometimes grey-green, lower paler, sometimes suffused reddish-purple particularly on veins. *Inflorescence* up to 36 flowers, few open simultaneously. *Peduncle* up to 250 mm. long, often much shorter, greenish-brown, pilose with glandular and eglandular hairs, glands sometimes absent. *Bracts* linear, up

to 3 mm. long, green, pilose. *Flower* 18—45 mm. long. *Pedice*l c. 10 mm. long, elongating in fruit, green, pilose with glandular and eglandular hairs, or glands sometimes absent. *Calyx* 5-partite, lobes linear-lanceolate, $2.5-5 \times 0.5-1$ mm., green to brown, pilose with glandular and eglandular hairs, glands sometimes absent. *Corolla* tube 10—15 mm. long, greenish-white or

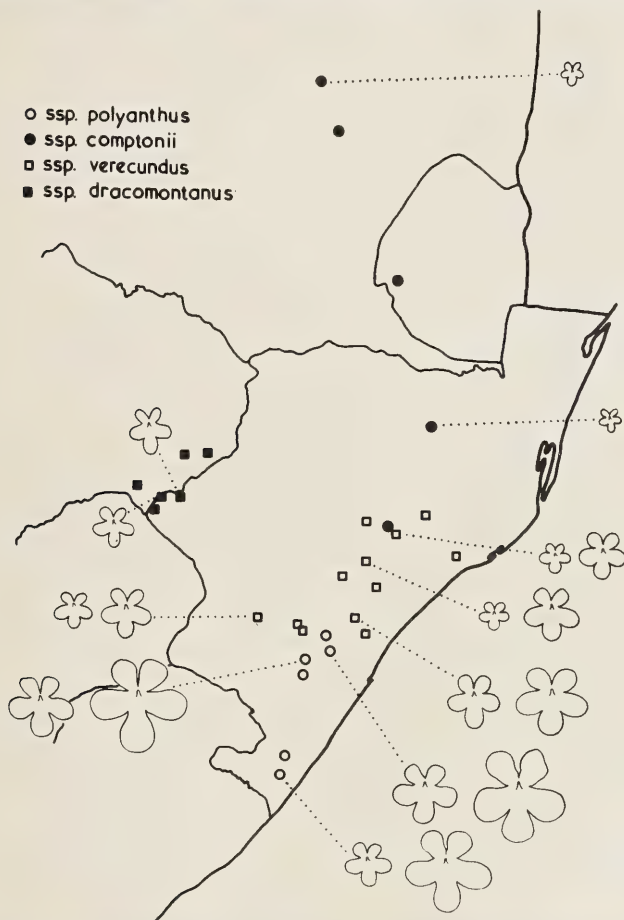


FIG. 4. Pictorialised distribution map of *S. polyanthus* showing similarity in limb shape, but variation in limb size, in the four subspecies. Single diagrams were drawn from herbarium material, pairs of diagrams illustrate size extremes in sampled populations (c. $\times \frac{1}{2}$).

very pale violet or whitish abaxially, suffused pale violet adaxially, glandular-pilose, pilose with glandular and eglandular hairs or pilose, base 3—4 mm. in diam.; limb rounded; upper lobes divergent, elliptic-oblong to orbicular, 3—15 × 2·5—12 mm.; lower lip 7—25 mm. long, lobes elliptic to orbicular, 4—17 × 2·5—14 mm.; all lobes pale to medium violet, glandular-pubescent inside, whitish, glandular-pubescent or pubescent outside; throat whitish, greenish-yellow or yellow. *Stamens*: filaments 2·5—4 mm. long, white, curved, curve slightly dilated, glandular or pubescent; anther lobes 1 mm. long, white or violet; posterior staminode minute, laterals 1—1·5 mm. long, white or violet. *Ovary* 4—7 mm. long, green, glandular or pubescent; style c. 2 mm. long, pubescent; stigma truncate to subcapitate. *Capsule* 16—65 mm. long, 2—2·5 mm. in diam.

Flowering period: July to February.

ssp. *polyanthus*, *Streptocarpus polyanthus* Hook. in Bot. Mag. t. 4850 (1855)*; Regel, Gartenf. 6 : 297, t. 206 (1857); Crocker in Journ. Linn. Soc. 5 : 65, t. 4, figs. 1—8 (1860); Rev. Hort. 1862 : 250,* 1889 : 398*, 1896 : 12,* Hielscher in Cohn, Beitr. 3 : 1—24, tt. 1—3 (1883); C.B.Cl. in DC. Monog. Phan. 5 : 149 (1883) et in Dyer Fl. Cap. 4 (2) : 440 (1904); Nichols. Dict. Gard. 3 : 516 (1887); Tracy Hubbard in Bailey, Std. Cyclopaedia Hort. 3 : 3274 (1937); Burt in R.H.S. Dict. Gard. ed. 2, 4 : 2045 (1956).

Bot. Mag. t. 4850, HOLOTYPE.

Plant perennial, robust; *leaves* 2 or 3, usually large and thick; *inflorescence* with stout peduncles and often many-flowered; *corolla* limb usually 25 mm. or more broad, lobes thick-textured, the two upper lobes strongly reflexed against the tube, uniform pale violet, white at base of lower lip, yellow in throat; *ovary* glandular-pubescent; *capsule* generally between 36 and 48 mm. long.

NATAL: **New Hanover distr.**, hills east of Nagle Dam, *Story* 6008, PRE. **Pietermaritzburg distr.**, Table Mt., c. 975 m., legit *Downing*, *Hilliard* 1821, NU; nr. Thornville, Farm "Lynmouth", *Hilliard* 2881, NU, E, K. **Richmond distr.**, Sand river, on cliffs, 792 m., *Hilliard* 803, NU. **Camperdown distr.**, Intshanga (Inchanga) 610 m., *Wood* 4824, K, NH; Inchanga, *Forbes* 612, NH; Umgeni valley, *Forbes* 1250, NH; Drummond, 457 m., *Lawson* 161, NU; Inchanga, *Wood* 6616, BM, K, PRE; near Inchanga, *Eshuis* 11306, PRE; Drummond, *Galpin* 9462, K, PRE; Inchanga, *Marloth* 4278, PRE; Inchanga, 671 m., *Hilliard* 801, NU; Umgeni valley, Botha's Hill area, 457 m., *Hilliard* 802, NU; Inchanga, *Stohr* N 15, BM; Inchanga, *Thorns* 289/45 NBG. **Port Shepstone distr.**, Oribi Gorge, 366 m., *Hilliard* 925, E, NH, NU; on St. Faith's road nr. Port Shepstone, 259 m., *Acocks & Hapfström* 1382, K.

ssp. *verecundus* Hilliard ssp. nov. a ssp. *polyantho* discreta folio singulo, flore saepe multo minore et capsulae brevitate.

NATAL: **New Hanover distr.** boundary, Noodsberg, Kingscliffe, *Hilliard* 2064, NU, HOLOTYPE, E, K, PRE, ISOTYPES.

Plant usually monocarpic, sometimes doubtfully perennial; *leaf* 1, with a second leaf occasionally developing; *inflorescence* slender, usually less than 12-flowered; *corolla* limb usually less than 26 mm. broad, upper lobes not strongly reflexed, uniform pale violet, yellow in throat; *ovary* pubescent, generally eglandular; *capsule* generally between 29 and 39 mm. long.

NATAL: **Nkandla dist.**, edge of Nkandla Forest below Isibundini Store, 1036 m., *Hilliard* 1169, NU; Qudeni, Mfongozi river, 914 m., *Hilliard* 1922, NU; nr. Dlolwana Store, 823 m., *Hilliard* 2669, NU; Nkandla Forest, Isibundini, 1067 m., *Hilliard* 2671, NU. **Ntonjaneni dist.**, Melmoth, v/d Merwe 2448 PRE. **Umvoti dist.**, Rietvlei, Greenwisch Farm legit. *Fry* sn. in herb. *Galpin* 2728, K, PRE; Farm "Mowbray", 1097 m., *Hilliard* 1209, NU. **Kranskop dist.**, Ntunjambili Mt., *West* 29186, PRE; Kranskop, 1219 m., *Thode* 3986, STE; forest patch on Kranskop-Middledrift road, *Hilliard* 2562, NU, K. **Mtunzini dist.**, Ngoye Forest, on granite domes, c. 290 m., *Hilliard* 2706, NU. **Lions River dist.**, Dargle, "The Dargle", 1554 m., *Hilliard* 1204, 1215, NU; Hilton College Estate, "The Pinnacle", 1006 m., *Hilliard* 2100, NU. **Mapumulo dist.**, near Fort Cross, c. 7 mls. Mapumulo on road to Kranskop, 1050 m., *Hilliard* 1002, NU. **Pietermaritzburg dist.**, Pietermaritzburg, in natural bush, *Gower* 13, NU. **Ndwedwe dist.**, c. 1 ml. Ndwedwe village, 685 m., *Hilliard* 1004, NU; Inanda Mt., c. 550 m., *Hilliard* 2129, 2039, NU, NH.

spp. *dracomontanus* Hilliard ssp. nov. a ssp. *polyantho* flore saepe multo minore et capsulae brevitate, a ssp. *verecundo* foliis pluribus discreta.

NATAL: **Bergville dist.**, Sungabala Pass, near "The Cavern", 1752 m., *Hilliard* 868, NU, HOLOTYPE.

Plant perennial; *leaves* 2 or 3; *inflorescence* short and relatively stout, generally few-flowered; *corolla* limb generally less than 20 mm. broad, upper lobes not strongly reflexed, uniform pale violet, yellow in throat; *ovary* pubescent, eglandular; *capsule* generally between 23 and 35 mm. long.

NATAL: **Bergville dist.**, Oliviershoek Pass, 1676 m., *Hilliard* 869, NU; farm "The Cavern", *Hodson* 33, NU; Oliviershoek Pass, c. 1800 m., *Thode* 4341, STE; Natal National Park, Plowmans Kop, *Acocks and Hapfström* 1381, PRE; National Park, Tugela Gorge, *Galpin* 10178, PRE.

ORANGE FREE STATE: **Harrismith dist.**, farm "Nelson's Kop", 1920 m., *Hilliard* 1214, NU; Witzieshoek, c. 1800 m., *Thode* 5647, STE; Harrismith, *Sankey* 218, K; Platberg, c. 1980 m., *Putrill* sn, PRE.

ssp. *comptonii* (Mansfeld) Hilliard, stat. et comb. nov. Cult. hort. Bot. Freiburg i Br. (1937), mis. *R. H. Compton*, Kirstenbosch, C.P. HOLOTYPE. *S. comptonii* Mansfeld apud Oehlkers in Zeitschrift für Botanik 32 : 327 (1938);

Burtt in Kew Bull. 1939 : 70 and in R.H.S. Dict. Gard. ed. 2, 4 : 2044 (1956).

Plant apparently monocarpic or perennial; *leaves* 1 or 2, small; *inflorescence* very slender, lax, up to 16-flowered; *corolla* limb generally less than 10 mm. broad, upper lobes not strongly reflexed, uniform pale violet, yellow in throat; *ovary* pubescent, generally eglandular, capsule generally between 29 and 37 mm. long.

TRANSVAAL: **Belfast dist.**, Dullstroom, Steenkampsbergen, 2134 m, *Galpin* 13020, PRE. **Carolina dist.**, Waterval Boven, *Gouws* sn. PRE.

SWAZILAND: **Mankaiana dist.**, nr. Sicanusa, 1219 m., *Compton* 27708, SGH.

NATAL: **Ngotshe dist.**, Ngome forest, around Tendeka rock, *Gerstner* 5169, PRE. **Nkandla dist.**, Nkandla forest, Nomangci rock outcrop, 1280 m., *Hilliard* 1200, NU; 8 miles s. Nkandla on road to Eshowe, *Codd* 9682, PRE.

Hooker described *S. polyanthus* from seedlings that appeared in a basket of living ferns brought to Kew from Natal in 1853. In his description he noted "a dried specimen of the same plant, and from the same country, we possess in our Herbarium, from our friend Mr. Sanderson; and it is, in all probability, the '*Didymocarpus*?' thus mentioned in Krauss, 'Natal Flora', p. 122, 'e summis montibus inter Maritzburg et Natalbay, alt. 2000—3000'".

Clarke (1883) redescribed the species, and cited *Sanderson* sn. K, *Robinson* sn. K, and *Gueinzus* 220, herb. Wien. Robinson's and Gueinzus' specimens have not been seen, but *Sanderson* sn. TCD, from "rocks above Sterkspruit" is *S. polyanthus*. This is probably a duplicate of the Kew specimen.

Clarke (1904) cited *Sanderson* 511, K, *Fry* 2728, K, *Wood* 4824 and 6616, K, *Gerrard* 2055 (doubtful *sic*) K, TCD. *Sanderson* 511 is *S. prolixus*, *Fry* 2728 is *S. polyanthus* ssp. *verecundus*, *Gerrard* 2055 is *S. cooksonii*, *Wood* 4824 and 6616 are *S. polyanthus* ssp. *polyanthus*. Wood collected his specimens at Inchanga which is very probably the mountain between Maritzburg and Durban (Natal Bay) mentioned by Krauss. The old wagon road between these towns runs just below the cliffs at the summit of Inchanga Hill, which support a large population of *S. polyanthus* ssp. *polyanthus*.

S. comptonii was described from plants raised from seed sent to Germany from Kirstenbosch, the seed having been collected originally by Galpin in the Steenkampsbergen, Transvaal. I have not seen the type, but have examined specimens raised from the original seed sent simultaneously to Germany and to the John Innes Horticultural Institute (cult. Trop. Dept., Kew. 11. iv. 1938).

S. comptonii differs from *S. polyanthus* in little other than degree of robustness, flower size and indumentum on the ovary. Relatively little is known about this taxon, which has seldom been collected. All known localities are on quartzitic rock. This somewhat unfavourable habitat could conceivably have resulted in genetically fixed diminutiveness, expressed particularly in flower size.

S. polyanthus ssp. *verecundus* is distinguished from typical *S. polyanthus* largely by its generally solitary-leaved condition and smaller flowers. *S. polyanthus* ssp. *dracomontanus* is virtually indistinguishable from ssp. *verecundus* except by its definitely perennial habit, substantiated by the presence, noticeable even in herbarium material, of old fruiting peduncles in association with new growth.

There is no clearcut discontinuity either in corolla or capsule size in the four taxa. Fig. 3 is a pictorialised scatter diagram correlating breadth of corolla limb and length of capsule, with symbols indicating presence or absence of gland-tipped hairs on corolla tube and ovary, and habit, i.e. monocarpic (one leaf), perennial (several leaves) or doubtful (where some specimens in a



FIG. 5. Distribution map of *S. proluxus*, *S. daviesii* and *S. silvaticus*.

population have more than one leaf, but no remains of old leaves and peduncles). The majority of measurements were made from dried specimens at NU.

All four taxa occupy different geographic areas and are therefore accorded subspecific rank. (Fig. 4). *Ssp. polyanthus* apparently has a limited distribution range in Natal from Table Mountain near Pietermaritzburg southwards to the Port Shepstone area, always at altitudes less than 760 m; *ssp. verecundus* extends roughly from Pietermaritzburg northwards to Melmoth at altitudes from 300 m. to 1500 m; *ssp. comptonii* is known to occur at Nkandla and Ngome in Natal, near Sicanusa in Swaziland, and Waterval Boven and the Steenkampsbergen in the eastern Transvaal, all at altitudes greater than 1200 m.; *ssp. dracomontanus* is apparently confined to the Drakenberg area of Natal and the Orange Free State, also at altitudes greater than 1200 m.

Habitat preference of *S. polyanthus* is generally for rock outcrops on hill-sides or krantzes above streams and rivers. The populations are usually on andstone, occasionally on granite, while *ssp. comptonii* is apparently always on quartzites. *Ssp. verecundus* is occasionally found on rocky terrain at the upper limits of escarpment forest, and *ssp. dracomontanus* habitually occupies mossy sandstone boulders in the well-illuminated parts of kloof forest.

Although *S. polyanthus* shows considerable variation in habit and in corolla size, it is nevertheless very easily recognised. The leaves are appressed-pilose. In living specimens, this often gives a grey-green cast to the leaves, which dry silky-silvery. The corolla limb is distinctive in that it is roundish (i.e. there is no well developed sinus between upper and lower lips. (See Fig. 4)). The thick-textured lobes are always uniform pale to medium violet, often with a yellow throat blotch, but no other markings. The capsule is relatively short and stout.

It is suspected that interspecific gene flow can sometimes blur these distinctions. *S. polyanthus* *ssp. polyanthus* and *S. prolixus* are virtually allopatric, but their distribution ranges overlap in the Hillcrest-Botha's Hill area inland from Durban. Here, populations of *S. polyanthus* *ssp. polyanthus* show, presumably, *S. prolixus* influence in their lax inflorescences and slender capsules, but the foliage and corolla shape and texture is typically *S. polyanthus*. In Oribi Gorge near Port Shepstone, large populations of *S. polyanthus* *ssp. polyanthus* grow on the sandstone cliffs above the Umzimkulu and Umzimkulwana rivers and on suitable roadside banks in the gorges themselves. These populations, too, are somewhat atypical in that the flowers are generally smaller, the inflorescences more slender and laxer and the capsules less stout than in typical *S. polyanthus*. *S. haygarthii* and *S. polyanthus* are sympatric here, and it is possible that there is some hybrid influence in the constitution of these populations.

2. *S. prolixus* C.B.Cl. in DC. Monog. Phan. 5 : 151 (1883) and in Dyer, Fl. Cap. 4 (2) : 446 (1904). Natal, Inanda, Wood 859, K, HOLOTYPE, NH, ISOTYPE. *S. gracilis* Burt in Kew Bull. 1937 : 514 and in R.H.S. Dict. Gard. ed. 2, 4 : 2044 (1956). Spec. hort. Bot. Reg. Kew, K, HOLOTYPE.

Perennial. Leaves 2 or 3, prostrate, up to 230×150 mm., upper surface dark green, lower paler, often suffused purplish-red. Inflorescence up to 36 flowers. Peduncle up to 200 mm. long, brown to green, pilose with glandular and eglandular hairs. Bracts linear, up to 3×1 mm., green, pilose. Flower c. 27 mm. long. Pedicel 9 mm. long, elongating considerably in fruit, green, pilose with glandular and eglandular hairs. Calyx 5-partite, lobes linear, 3×1 mm., brownish-green, pilose with glandular and eglandular hairs. Corolla tube c. 13 mm. long, very pale violet adaxially, white abaxially, glandular-pilose, base 3 mm. in diam.; limb slightly "waisted"; upper lobes divergent, oblong to obovate, $7-11 \times 5-6$ mm.; lower lip $12-18$ mm. long, marked with impressed lines, lobes oblong or oblong-ovate, $6-10 \times 4-8$ mm.; all lobes very pale violet, glandular inside, paler, sparsely glandular outside; throat yellow. Stamens: filaments 2 mm. long, slightly curved, sparsely glandular; anther lobes 1 mm. long, white; posterior staminode minute, laterals 1 mm. long, white. Ovary 5 mm. long, greenish-brown, appressed pubescent; style 1.5 mm. long, pubescent, sparsely glandular; stigma subcapitate, translucent. Capsule $18-48$ (33 ± 5) mm. long, 1.5 mm. in diam.

Flowering period: Oct. to Dec.

NATAL: Ndwedwe dist., Inanda Mt., 600 m., Hilliard 2040, NU; Inanda dist., Inanda, Groeneberg, 487 m., Johnson 1310, NH, PRE, —do— Shepherd 152, NH, —do—, 427 m., Hilliard 804, E, NU, K, 808, NU; Inanda Falls, 610 m., Schelpe 2964, BM; Kronsberg (Umgeni) (sic, probably Groeneberg) c. 760 m., Thode 5282, STE. Camperdown dist., near Shongweni Falls, Schelpe 83, NU; Botha's Hill area, Valley of a Thousand Hills, 579 m., Hilliard 806, E, NU, NH; Farm "Waterfall", 549 m., Hilliard 2139, E, NH, NU; Botha's Hill, Kearsney College, 610 m., Hilliard 2809, NU; Cato Ridge, Fairall 107, NBG. Pinetown dist., Fields Hill, 366 m., Sanderson 511, K, TCD; near Palmiet, Evans 142, NH; Everton, Eskotene, 610 m., Hilliard 871, NU; Westville, near Durban, Palmiet River, 107 m., Hilliard 823, E, K, NH, PRE, NU; Forest Hills, Kloof, 610 m., Hilliard 805, NU; Delville Wood, 427 m., Hilliard 822, NU. Umlazi dist., Umlazi, sine nomen, sine numero, NH. Near Durban, Wood 10998, NH; Britten sn. PRE; Hallack 3, TCD.

S. prolixus is closely allied to *S. polyanthus* from which it is primarily distinguished by its differently shaped corolla limb and by its more slender capsules.

In its type locality, *S. prolixus* is found in myriads in rock crevices at the upper limits of escarpment forest on the Groeneberg, Inanda, and Inanda

Mountain. Numerous populations occur along the lips of kloofs in the shelter of streambank forest in the Kloof and Everton areas, Pinetown district. Burt (1937) described *S. gracilis* from plants raised from seed from Kloof, but the Kloof and Inanda populations are indistinguishable.

Flower colour is very variable. The populations at Inanda range from almost white to medium violet, with a yellow throat blotch of corresponding intensity. Those from Kloof and Everton are mostly medium violet with a pronounced yellow blotch, and of two known populations near Botha's Hill, one has very pale violet flowers, the other small pure white flowers, both with pale yellow blotches.



FIG. 6. Distribution map of *S. pentherianus*.

One of these Botha's Hill populations (Hilliard 2809) is interesting in that its small white flowers closely resemble those of *S. pentherianus*. The population too is on krantzies in grassveld, the habitat mostly favoured by *S. pentherianus* but not generally by *S. prolixus*. It is tempting to attribute this to possible ancient hybrid influence on the premise that the two species were once in contact, but on the Groeneberg where forest gives way to boulder strewn grassveld, the *S. prolixus* population extends into the grassveld under boulders and the flowers are noticeably smaller and paler than in the main forest population. This Botha's Hill population needs careful analysis before definite conclusions can be drawn.

Beside the road at the summit of the escarpment at Kingscliffe in the Great Noodsberg, a small stream has eroded out a clay seam, leaving a long, narrow cleft in the hillside, partly obscured by streambank forest. The rock walls of this cleft support a large population of *Streptocarpus* which is probably of hybrid origin. (Hilliard 884, NU; West 2008, PRE.) Individuals appear to be sexually reproductive and the population is morphologically constant, variation being confined to slight differences in corolla size and in shape of corolla lobes.

Anomalous population at Kingscliffe

Perennial. *Leaves* 1—5, suberect, up to 170×80 mm., but often much narrower, upper surface dark green, lower purple-red. *Inflorescence* up to 10 flowers, few open simultaneously. *Peduncle* up to 150 mm. long, slender, greenish-brown, sparsely pilose with glandular and eglandular hairs. *Bracts* linear, up to 3×0.5 mm., brown, sparsely pilose with glandular and eglandular hairs. *Flower* 28—33 mm. long. *Pedice*l up to 12 mm. long, greenish-brown, sparsely pilose with glandular and eglandular hairs. *Calyx* 5-partite, lobes linear-lanceolate, 3×1 mm., brown, sparsely pilose with glandular and eglandular hairs. *Corolla* tube 11—13 mm. long, medium violet adaxially, paler abaxially, pilose with glandular and eglandular hairs, base 2.5—3 mm. in diam., limb more or less rounded; upper lobes divergent, reflexed, elliptic to sub-orbicular, $8-9 \times 6-7$ mm.; lower lip 13—16 mm. long, lobes elliptic to orbicular, $8-9 \times 7-9$ mm.; all lobes medium violet, sparsely glandular inside, paler, glabrous outside, white at base of lower lip, yellow blotch in throat. *Stamens*: filaments 4 mm. long, pale violet, curved, sparsely pilose basally, glandular apically; anther lobes 1 mm. long, purplish-violet, darkening at maturity; posterior staminode minute, laterals 2 mm. long. *Ovary* 4—5 mm. long, green, pubescent; style c. 2 mm. long, pubescent; stigma truncate to subcapitate. *Capsule* 25—30 mm. long, 1.5 mm. in diam.

The population appears to be morphologically intermediate between *S. polyanthus* and *S. prolixus* or possibly *S. silvaticus*. The inflorescence is

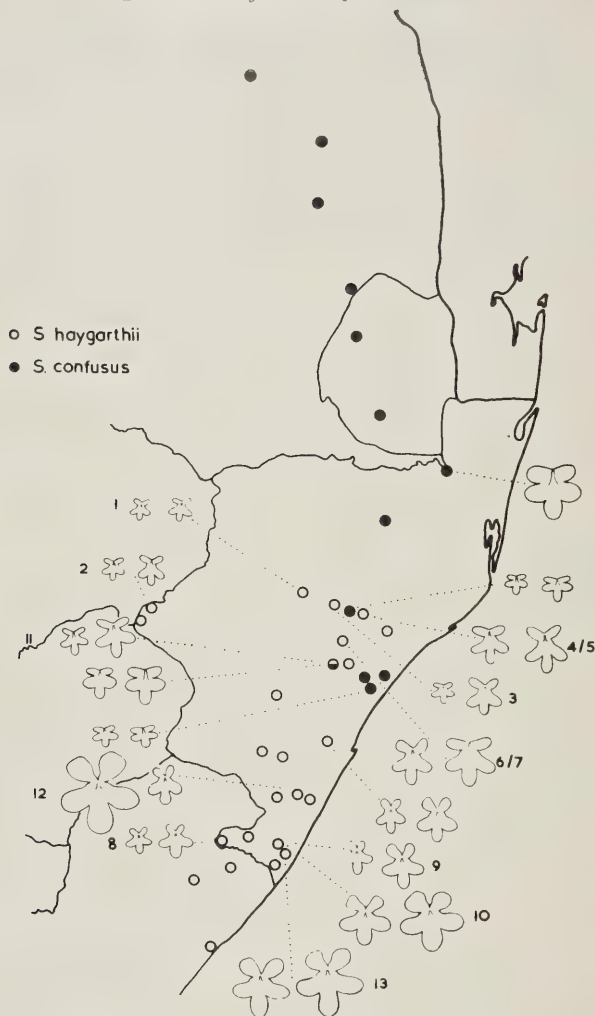


FIG. 7. Pictorialised distribution map of *S. confusus* and *S. haygarthii* showing constancy in limb shape. Size extremes in sampled populations are illustrated (c. $\times \frac{1}{2}$) with one corolla (Jozini Dam) from herbarium material.

TABLE I.

To show colour variation in corolla limb in populations of *S. haygarthii*, numbered as in Fig. 7.

1. Uniform pale violet.
2. Uniform pinkish-white.
3. White suffused palest violet, usually dark blotch on lower lip.
4. White suffused palest violet.
5. Whitish.
6. Pale to medium violet, dark blotch on lower lip.
7. Pale to medium violet, dark blotch on lower lip.
8. Pure white.
9. White occasionally suffused violet.
10. Pale violet, sometimes yellow in throat.
11. Whitish to very pale violet, sometimes yellow in throat, sometimes violet streaks on lower lip.
12. Pale to medium violet, yellow in throat, dark violet suffusion around mouth.
13. Pale violet suffused deep violet around mouth.

few-flowered as in *S. polyanthus* spp. *verecundus* and *S. silvaticus*. The flowers closely resemble those of *S. polyanthus* in all respects except colour, being darker than *S. polyanthus*, but no darker than some forms of *S. prolixus*. The capsules are similar to those of both *S. prolixus* and *S. silvaticus*, but unlike those of *S. polyanthus*. The leaves of both *S. polyanthus* and *S. prolixus* are thick and stiff and lie more or less flat on the ground. Those of *S. silvaticus* are softer textured and are often suberect. The anomalous population resembles *S. silvaticus* in this respect.

It may be significant that the nearby escarpment edge supports a large population of *S. polyanthus* ssp. *verecundus*. Neither *S. prolixus* nor *S. silvaticus* has been recorded from the area. The Great Noodsberg lies between the territories now occupied by these two species, and either of them might once have occurred in the neighbourhood to hybridise with *S. polyanthus* ssp. *verecundus*.

3. *S. silvaticus* Hilliard sp. nov. *S. prolixo* C.B.Cl. cognatus autem et nonnullis foliis suberectis, et stigmatibus turbinatis et habitu et habitatione distinguitur.

Herba acaulis perennis epiphytica. *Folia* 2—5, ad 120 × 70 mm., pilosa, supra rugulosa, media viriditate, venis impressis, subtus pallidiora, aliquando ianthino suffusa, venis prominentibus. *Inflorescentiae* cymosae, complures ex ordine ab superficie adaxiali prope costae imam partem; flores perpauci, 1 vel 2 simul expansi. *Pendunculus* ad 160 mm. longus, viridis vel purpureofuscus, parce pilosus, interdum glaber. *Bractae* lineares, c. 1.5 mm. longae, virides, pilosae. *Flos* c. 32 mm. longus. *Pedicellus* 8—25 mm. longus, viridis, parce pilosus. *Calyx* quinquepartitus, lobi lineares, 4 × 1 mm., virides, pilosi. *Corolla* bilabiata; tubus 15 mm. longus, viridicans, pubescens, anguste subcylindricus, angulo acuto deflexus, deinde prorsum proiectus, ad medium

angustior, paullo latior ad orem, quem a latere compressum est; limbus paullo obliquus, lobi superiores divergentes, oblongi ad suborbiculares, 10×7 mm.; labrum inferius 18 mm. longum, carinis duabus parvis sed manifestis ab ima parte lobi anterioris in faucem patentibus, lobi oblongi ad suborbiculares, 12×10 mm., lobi omnes purpurei-pallidi, praeter pubertatem glandulosam circum orem glabri; faux fulvo-viridis. *Stamina*: fertilia 2, filamenta 3 mm. longa, curvata, viridi-alba, parce glanduloso-pilosa, ad medium corollae tubum inserta; antherarum lobi confluentes, 1 mm. longi, fulvi; staminodia 3, minima. *Ovarium* 3 mm. longum, viride, subtiliter pubescens; stigma turbinatus, 1 mm. longum, translucens. *Capsula* 17—54 (30 ± 8) mm. longa, 1.5 mm. lata.

NATAL: **Richmond dist.**, farm "Osgodsbys", 1142 m., *Hilliard* 811, NU, HOLOTYPE, E, K, PRE, ISOTYPES.

NATAL: **Umvoti dist.**, Greytown, Dam Waterval, v/d Merwe 2497, PRE. **Lions River dist.**, farm "The Dargle", 1554 m, *Hilliard* 1211, NU; Karkloof, farm "The Start", 1067 m., *Hilliard* 1000, NU; Dargle, farm "Kilgobbin", 1311 m, *Hilliard* 845, K, E, NH, NU, PRE; Karkloof, Blinkwater Bush, 1524 m, *Hilliard* 2603, NU. **Polela dist.**, Donnybrook, Xumeni Forest, 1372 m, *Hilliard* 2477, NU, PRE. **Pietermaritzburg dist.**, Winterskloof, F.G.C. sn, J37540, J. **Richmond dist.**, Byrne Valley, farm "Newborough Grange", 1128 m, *Hilliard* 840, E, NU; Richmond, Byrne, *Galpin* 11979, K, PRE; Richmond, Enon Forest, 1189 m, *Hilliard* 2029, NU. **Ixopo dist.**, Qunu Falls, 1036 m, *Hilliard* 923, E, K, NU. **Alfred dist.**, Weza, Mpetyne Forest, c. 1200 m, *Hilliard* 1923, NU.

CAPE: **Umzimkulu dist.**, Insikeni Forest, 1615 m, *Hilliard* 2486, NU. Perennial. *Leaves* 2—5, suberect, up to 120×70 mm., upper surface mid-green, lower paler, occasionally suffused purple. *Inflorescence* flowers few (c. 10), 1 or 2 expanded simultaneously. *Peduncle* up to 160 mm. long, green or purple-brown, sparsely pilose, sometimes glabrous. *Bracts* linear, c. 1.5 mm. long, green, pilose. *Flower* c. 32 mm. long. *Pedicele* 8—25 mm. long, green, sparsely pilose. *Calyx* 5-partite, lobes linear, 4×1 mm., green, pilose. *Corolla* tube 15 mm. long, greenish, pubescent, base 2.5 mm. in diam.; upper lobes divergent, oblong to suborbicular, 10×7 mm.; lower lip 18 mm. long, with 2 small but distinct keels extending from base of anterior lobe into throat, lobes oblong to suborbicular, 12×10 mm., all lobes pale violet, glabrous except for glandular pubescence around mouth; throat yellow-green. *Stamens*: filaments 3 mm. long, curved, greenish-white, sparsely glandular pilose; anther lobes 1 mm. long, yellow; staminodes minute. *Ovary* 3 mm. long, green, minutely pubescent; style 1.5 mm. long, greenish-yellow, minutely pubescent; stigma conical, 1 mm. long, translucent. *Capsule* 17—54 (30 ± 8) mm. long, 1.5 mm. in diam.

Flowering period: Oct. to Jan.

S. silvaticus is extremely common in forests at altitudes greater than 900 m., excluding the Drakensberg forests, and has a known distribution range from the Greytown area, Natal, to East Griqualand (Fig. 5). It is so common that it is amazing it has for so long been overlooked. It shares with *S. daviesii* the distinction of growing only epiphytically or lithophytically, and like that species shows little floral variation. *S. silvaticus* virtually replaces *S. daviesii* in the Mistbelt forests south of the Tugela, and although it could never be mistaken for that distinctive species, floristically they are very similar and have almost identical stigmas.

Herbarium material of *S. prolixus* and *S. silvaticus* can be difficult to distinguish. Both corolla and capsule are very similar, but the stigma of *S. silvaticus* is always conical, whereas that of *S. prolixus* is subcapitate. The two species also differ markedly in habit and habitat. *S. silvaticus* is always epiphytic or lithophytic in Midlands forest at altitudes greater than 900 m. *S. prolixus* is always rooted in soil or wedged in rock crevices at altitudes less than 670 m.

4. *S. daviesii* N.E.Br. ex C.B.Cl. in Dyer, Fl. Cap. 4(2) : 439 (1904), B. L. Burtt in R.H.S. Dict. Gard. ed. 2, 4 : 2044 (1956). Zululand, Qudeni Forest, 1829 m., *J. M. Wood* 7963 legit *G. W. Davies* 55, K, HOLOTYPE, NH, ISOTYPE.

Perennial. *Leaves* 1 or 2, up to 240 × 175 mm., usually much smaller, often markedly cordate, apex acute, usually unwithered, upper surface pale green, lower paler, occasionally suffused purple, midrib plane. *Inflorescence* flowers several (c. 20), few open simultaneously. *Peduncle* up to 100 mm. long, brown to green, pilose. *Bracts* lanceolate, up to 10 × 2.5 mm., green, pilose.

Flower c. 45 mm. long. *Pedicel* c. 6 mm. long, green, pilose. *Calyx* campanulate, tube 5 mm. long, green, glabrous within, pubescent without; lobes 5, deltoid, 5 × 4.5 mm., green, pubescent without, glabrous within. *Corolla* tube c. 18 mm. long, base 3 mm. in diam., tube widening upwards, strongly compressed laterally in upper half, greenish abaxially, deep violet adaxially, pilose with glandular and eglandular hairs without, pubescent within; upper lobes divergent, suborbicular, 14 × 12 mm.; lower lip 23 mm. long, lobes suborbicular, 13 × 14.5 mm., with 2 raised keels extending from base anterior lobe into throat; all lobes medium violet fading to white in mouth, paler outside, sparsely pilose with glandular and eglandular hairs; yellow blotch in throat. *Stamens*: filaments 2 mm. long with small swelling apically, white, pubescent; anther lobes 1.5 mm. long, apiculate, white; posterior staminode minute, laterals 1 mm. long, white. *Ovary* 5 mm. long, green suffused purple apically, appressed pubescent; style 2.5 mm. long, greenish, pubescent; stigma conical, translucent. *Capsule* 28—53 (40 ± 5) mm. long, 2 mm. in diam.

Flowering period: Dec. to March.

SWAZILAND: **Mbabane dist.**, Black Mbuluzi River Valley, 1173 m., *Hilliard* 3106, NU.

NATAL: **Ngotshe dist.**, Ngome forest, c. 1060 m, *Hilliard* 865, NU. **Nkandla dist.**, Qudeni, *Dyer and Collett* 4703, K, PRE; Qudeni, *Codd* 9676, PRE; Qudeni, *Fisher and Schweickerdt* 70, NH, NU, PRE; Qudeni, *Gerstner* 665, PRE; Qudeni, *Fisher* 861, NH, NU, PRE; Qudeni, c. 1500 m., *Hilliard* 859, NU; Nkandla, *Smuts*, sn, PRE; do. *Gerstner* 3219, K, PRE; do. *Wylie* in herb. *Wood* 8835, NH; do. *Strey* 4157, NU; do. *Laughton* J 32159, J. **Kranskop dist.**, Ntunjambili Mt., Middledrift road, *West* sn, PRE; road to Middledrift, c. 1060 m., *Hilliard* 1455, NU, 2561, NU. **Mtunzini dist.**, Ngoye Forest, *Huntley* 296, PRE; Ngoye Forest, 274 m., *Hilliard* 2709, NU.

S. daviesii is very readily recognised by its campanulate calyx and its habit of producing only one flowering leaf per season with next year's young leaf superimposed upon it. *S. penterianus* occasionally develops superimposed leaves, but these are easily distinguished from the light green, cordate leaves of *S. daviesii*. Similarities in corolla and stigma structure suggest close affinity between *S. daviesii* and *S. silvaticus*.

Like *S. silvaticus*, *S. daviesii* grows epiphytically or on rock faces, and shows very little morphological variation. Throughout Qudeni and Nkandla forests, where it is particularly common, the corolla is medium violet with occasional paler or darker specimens. In the forest patch on the road from Kranskop to

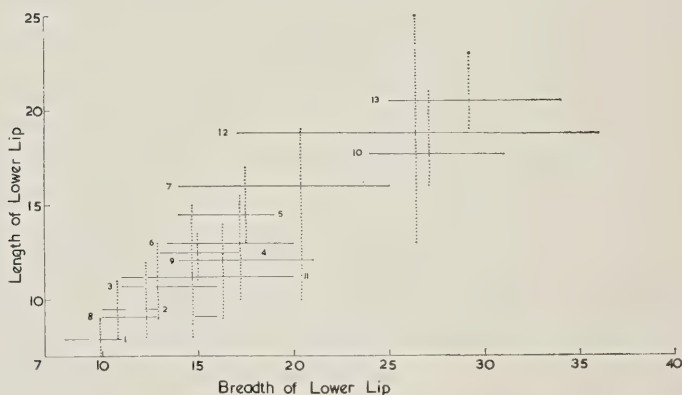


FIG. 8. Pictorial diagram illustrating limits and means of dimensions of lower lip in *S. haygarthii*. (Numbers refer to populations illustrated in Fig. 7.) (All measurements in mm.)

Middledrift, the margins of the corolla lobes have a decidedly pink tinge, and the few specimens (quite the largest yet seen) noted in Ngoye forest were almost pure white.

Until recently, *S. daviesii* was thought to be confined to Qudeni and Nkandla forests and the forest facing them across the Tugela below Kranskop. Field work extended the known range to Ngoye and Ngome forests, but it was a surprise to find extensive populations over a hundred miles north of Ngome on granite boulders in forest patches near Mbabane, Swaziland.

Occasional hybrids between, presumably, *S. daviesii* and *S. haygarthii* have been seen in Qudeni forest and between Kranskop and Middledrift.

S. S. pentherianus Fritsch apud Zahlbruckner in Ann. Hofm. Wien **15**: 71 (1900). NATAL: near Colenso, leg. Krook (pl. *Penther* 2107), Wien, HOLOTYPE. Perennial. Leaves 1 to 3, up to 120×84 mm., upper surface dark green, lower paler, occasionally suffused purple. Inflorescence few-flowered (c. 12 flowers). Peduncle up to 120 mm. long, greenish-brown, pilose with glandular and eglandular hairs. Bracts linear, up to 2×0.5 mm., green, pilose with glandular and eglandular hairs. Flower c. 18 mm. long. Pedicel c. 10 mm. long, elongating to 20 mm. in fruit, green, sparsely pilose, glandular. Calyx 5-partite, lobes linear, 2×0.5 mm., green, pilose with glandular and eglandular hairs. Corolla tube 9 mm. long, greenish-white, sometimes suffused medium violet adaxially, pilose with glandular and eglandular hairs; upper lobes divergent, elliptical, 6×3 mm.; lower lip 10 mm. long, lobes oblong to suborbicular, c. 6×4 mm.; all lobes white, minutely glandular-pubescent inside, pubescent with glandular and eglandular hairs outside, yellow blotch in throat. Stamens: filaments 2.5 mm. long, slightly curved, greenish-white, glandular; anther lobes 1 mm. long, purplish; posterior staminode minute, laterals 0.5 mm. long, white. Ovary 2 mm. long, green, pubescent, sparsely glandular; style 1 mm. long; stigma truncate to subcapitate. Capsule 9—20 (14 ± 2) mm. long, 2 mm. in diam., often deflexed at maturity.

Flowering period: Nov. to March.

TRANSVAAL: **Belfast dist.**, Belfast, *Leendertz* 2679, PRE. **Carolina dist.**, Witkloof, *v/d Merwe* sn, PRE; between Carolina and Badplaats, *v/d Merwe* 2267, PRE; Carolina, *Moss and Rogers* 1141, BM, K, J. **Ermelo dist.**, Roodepoort, 1730 m., *Henrici* 1688, PRE; Nooitgedacht, 1730 m., *Henrici* 237, PRE. **Volksrust dist.**, Volksrust, *Jenkins* 9311, PRE; summit Paardekop range, c. 2200 m., *Galpin* 9856, PRE. **Wakkerstroom dist.**, *van Dam* 24353, PRE; Waterval, *v/d Merwe* 2062, PRE; Mavrieriestad, *Pott* 15169, PRE.

SWAZILAND: **Mbabane dist.**, c. 25 mls. W. Mbabane, *Story* 5426, PRE; below farm "Stroma", c. 1200 m., *Hilliard* 3103, NU; c. 7 mls. turnoff to Piggs

Peak from Mbabane-Ermelo rd., c. 1300 m., *Hilliard* 3091, NU; Mbabane, Fonteyn, 1430 m., *Hilliard* 3069, NU; Ngotshane Rocks, c. 1500 m., *Compton* 26789, SGH; Hawane Falls, c. 1300 m., *Compton* 27413, SGH.

BASUTOLAND: without precise locality, *Cooper* 947 in partim, K.

NATAL: **Newcastle dist.**, Coldstream, *Rehmann* 6916, K (cited by Clarke (1904) as *S. pusillus*); Laings Nek, *Marais* 361, K, PRE; Normandien Pass, 1935 m., *Hilliard* 1038, 2376, NU; Drakensberg near Newcastle, *Wilms* 2173, K; Mullers Pass, "Moorfield", 1890 m., *Hilliard* 2340, NU; Farm "Majuba" on Quagga's Nek road, 1829 m., *Hilliard* 2258, NH, NU. **Utrecht dist.**, Pongola Mts. to Kaffir Drift, *Thode* A340, NH, PRE; summit escarpment between Groenvlei and Wakkerstroom, 1950 m., *Hilliard* 2249, E, NU. **Paulpietersburg dist.**, summit Dumbe Mt., *Galpin* 9664, PRE. **Bergville dist.**, Oliviershoek, 15—1800 m., *Thode* 7828, STE; Strydhoek, near Tintwa Mt., *Doidge* sn, PRE. **Klip River dist.**, Van Reenen, 1768 m., *Phillips* sn, PRE; Van Reenen, 15—1800 m., *Wood* 6275, PRE; Van Reenen Pass, 1676 m., *Hilliard* 1034, NU, 1846, E, K, NU; Collings Pass, 1676 m., *Hilliard* 1041, NU. **Dundee dist.**, Hattingspruit, *Scott*, sn, PRE; Dundee, Mpati Mt., *Shirley* sn, NU. **Nqutu dist.**, Nqutu, *Gerstner* 2858, NH. **Vryheid dist.**, Vryheid Mt., *v/d Merwe* 2653, PRE; Inhlatshe Mt., *Gerstner*, sn, NH; Mt. near turnoff from Vryheid to Natal Spa, 1264 m., *Hilliard* 3116, NU. **Helpmekaar-Msinga dist.** boundary, farm "Elands-kraal", 1372 m., *Hilliard* 1819, NU. **Babanango dist.**, 15 mls. N. Qudeni, 1615 m., *Fisher and Schweickhardt* 121, NU, PRE; do., *Hilliard* 827, E, K, NU, NBG. **Estcourt dist.**, Bushmans River valley, c. 1800 m., *Thode* 5551, STE; Giant's Castle Game Reserve, c. 1500 m., *Skead* 145, NU; Lowlands, *Schelppe* 32, NU; Tabamhlope forest, *West* 1419, PRE; 3·7 mls. E. Tabamhlope Police Station, *Marais* 1468, PRE; Tabamhlope Mt., 1890 m., *West* 1358, PRE; 0·2 mls. White Mt. Inn, Hlatikulu, 1585 m., *Killick and Marais* 2166, PRE; Dalton Bridge, 1341 m., *Pentz* 583, K, PRE; do., c. 1200 m, *West* 1359, PRE; Lowlands, 1341 m., *Hilliard* 852, NU; Willowgrange, 1356 m., *Hilliard* 853, E, NU; Tabamhlope Mt., 1707 m., *Hilliard* 1491, NU. **Weenen dist.**, Weenen veld reserve, 1006 m., *Pentz and Acocks* 10728, NH. **Umvoti dist.**, 8 mls. Greytown on Mudon rd., *Hilliard* 1231, NU. **Mpendle dist.**, Lundies Hill en route Bulwer, 1264 m., *Hilliard* 817, NU; **Underberg dist.**, Sani Post (*sic* Pass), *Webb* 133, NU; Sani Pass area, 1600 m., *Hilliard* 954, 1035, NU. **Polela dist.**, Bulwer, Marwaga Mt., *Marais* 1455, PRE; Bulwer, Ngelabantwan River, 1372 m., *Hilliard* 860, NU; Donnybrook, "Meadow Farm", 1280 m., *Hilliard* 2962, NU.

This small species is usually found at altitudes greater than 1200 m., growing in the crevices of rock outcrops with a southerly aspect. In the Drakensberg area it is usually on mossy rocks in forest. It is widely distributed in Natal,

Swaziland and the south eastern Transvaal (Fig. 6) and shows no significant variation throughout its range.

S. pentherianus is easily distinguished from all other members of the group by its short capsule. It has been much confused with *S. pusillus* but this is lack of observation of the corolla tube which is narrow, bent, and compressed in the mouth in *S. pentherianus*, relatively broad, almost straight, and cylindric in the mouth in *S. pusillus*. It could conceivably be confused with *S. polyanthus* ssp. *comptonii* but apart from marked differences in the shape and colouring of the corolla limb, the short capsule, generally shorter than the pedicel, is diagnostic of *S. pentherianus*.

6. *S. confusus* Hilliard sp. nov. *S. haygarthii* cognatus, discretus autem corollae limbo longo cujus media pars non contracta est, quae contractio *S. haygarthii* propria est.

Folium 1, ad 300×170 mm., supra viridis-nigrum, subtus pallidior rubropurpureo suffusum praecipue in venis lateralibus, interdum glandulosum. *Inflorescentiae* ab hypocotyle et ima parte costae orientes; flores plurimi, pauci eodem tempore expansi. *Pedunculus* ad 300 mm. longus, fuscus vel viridis, pilosus. *Bracteae* lineares, ad 4×1 mm., aut fuscae aut virides, pilosae. *Flos* 20–30 mm. longus. *Pedicelli* c. 8 mm. longi, paullo longiores in fructificatione, viridi-fusci, glandulosi, pilosi. *Calycis* lobi lineares, 2.5×0.5 mm., virides vel fusci, pilosi. *Corolla* bilabiata; tubus 10–15 mm. longus, adaxiale ianthino-pallidus, abaxiale albus, glanduloso-pilosus, parte inferiore 2.5 mm. lata, fauce a lateribus compressa; limbus fere oblongus, parte media non contracta; lobi superiores divaricati; labrum inferius 8–13 mm. longum, lineis impressis obscure notatum; lobi omnes oblongi ad suborbiculares, $6-7 \times 4-7$ mm., ianthino-pallida, intus glandulosi, extra pallidiores glanduloso-pilosi; fauces aut albae aut luteae. *Stamina* fertilia 2; filamenta 3 mm. longa, paullo curvata, alba suffusa ianthino-suffusa, parce glandulosa, in medio corollae tubo orientia; antherarum lobi 1 mm. longi, albi; staminodia 3, posteriora admodum minima, lateralia 1 mm. longa. *Ovarium* 6 mm. longum, viride, pubescens; stylus 1 mm. longus, albus, pubescens; stigma capitatum. *Capsula* 42–91 (66 ± 10) mm. longa, 2 mm. lata.

NATAL: **Mapumulo dist.**, tributary Nsuzi River, 610 m., Hilliard 807, NU, HOLOTYPE; E, PRE, ISOTYPES.

TRANSVAAL: Letaba dist., The Downs, Story 5409, PRE; The Downs, S. slopes Mamatseeri Mt., Burt 2912, E, NU, PRE. **Pilgrimsrest dist.**, Mariepskop, Burt 2930, E, NU, PRE; Mariepskop, Merxmüller 621, K; Sabie Forest Reserve, Ceylon Section, 1190 m., Hilliard 2958, E, NU. **Barberton dist.**,

Barytes Mine, Barberton-Havelock rd., Burt 2942, E, NU, PRE. **Dist. unknown**, Umzeila, Mudd sn, K.

SWAZILAND: **Hlatikulu dist.**, Hlatikulu, c. 1200 m., Compton 27421, SGH.

NATAL: **Ngotshe dist.**, Ngome, forest patch beside road to Nongoma, 930 m., Hilliard 872, E, NU, 867, NU, NH; 6 mls. SE Ngome Forest Station, 945 m., Codd 9600, PRE; Ngome, Gerstner 5169, PRE. **Nkandla dist.**, Nsuze River Valley on Qudeni-Nkandla road, Burt 2970, E, NU. **Umvoti dist.**, near Glenmill, 168 m., Hilliard 857, E, NU; near Ahrens, farm "Mowbray", 1067 m., Hilliard 1005, E, NU; road to Lilani, Mrs. H. Alderton sn, NU; near Lilani, 914 m., Hilliard 843, NU, 1956, NH, NU. **Lower Tugela dist.**, near Darnall, Kildare Estate, 168 m., Hilliard 926, NU, PRE; 3 mls. Doornkop on Mapumulo Road, c. 600 m., Hilliard 2122, NU.

Monocarpic. *Leaf* 1, up to 300×170 mm., upper surface dark green, lower paler, suffused purplish-red particularly on lateral veins, sometimes glandular. *Inflorescence* from hypocotyl and base of midrib, flowers numerous, few expanded simultaneously. *Peduncle* up to 300 mm. long, brown to green, pilose. *Bracts* linear, up to 4×1 mm., brown or green, pilose. *Flower* 20–30 mm. long. *Pedicel* c. 8 mm. long, elongating slightly in fruit, greenish brown, pilose with glandular and eglandular hairs. *Calyx* lobes linear, 2.5×0.5 mm., green to brown, pilose. *Corolla* tube 10–15 mm. long, pale violet adaxially, white abaxially, pilose with glandular and eglandular hairs, base 2.5 mm. in diam; limb more or less oblong, not "waisted", upper lobes divaricate; lower lip 8–13 mm. long, faintly marked with impressed lines; all lobes oblong to suborbicular, $6-7 \times 4-7$ mm., pale violet, glandular-pubescent inside, paler, pilose with glandular and eglandular hairs outside; throat white or pale yellow. *Stamens*: filaments 3 mm. long, slightly curved, white suffused violet, sparsely glandular; anther lobes 1 mm. long, white; posterior staminode minute, laterals 1 mm. long. *Ovary* 6 mm. long, green, appressed pubescent; style 1 mm. long, white; stigma subcapitate. *Capsule* 42–91 (66 ± 10) mm. long, 2 mm. in diam.

Flowering period: Oct. to March.

S. confusus is found on the walls of kloofs or on steep earth or rock banks, generally in forest, but it seems, at least in Natal, to be far more tolerant of drier and more exposed habitats than *S. haygarthii*. This is well demonstrated along the road to Lilani, near Greytown, the only known locality where the two species grow together. *S. haygarthii* favours moist banks on the forest floor, *S. confusus* drier, shaded banks not necessarily in forest. In Natal populations, the primary peduncle arises from the apex of the hypocotyl and not from the base of the midrib as is usual in this group. The manner in which the

peduncle then curls up through the leaf sinus is easily detected even in herbarium material.

S. confusus has a distribution range in eastern Natal from north of Durban through Swaziland to the eastern Transvaal (Fig. 7). In all known Natal populations as far north as Ngome, the primary peduncle develops from the hypocotyl. Hlatikulu forest, Swaziland, supports large populations in which this character can sometimes be detected, but further north at Mbabane, in the forests between Havelock and Barberton, and northwards to Sabie and Mariepskop, it disappears entirely and the primary peduncle develops from the upper surface of the leaf at the base of the midrib. These populations are found in wetter forest habitats than in Natal, so this may be a character developing only under the influence of drier habitat conditions.

The one constant character distinguishing this species from *S. haygarthii* is the shape of the corolla limb. The two upper lobes are markedly divaricate and the two lateral lobes of the lower lip diverge immediately with practically no development of a sinus between upper and lower lips. This distinguishes *S. confusus* from *S. haygarthii* in which a sinus is always developed and the limb can be described as "waisted". In *S. confusus* the mouth of the corolla tube and the point of divergence of the two upper lobes are always contiguous. In those populations of *S. haygarthii* with only slight development of "waisting", the upper lobes are divergent rather than divaricate, and the mouth of the corolla tube is always one or two mm. below the point of divergence (Fig. 7). The two species thus never need be confused, and are easily distinguished from all other members of the group by their solitary leaves and long capsules.

Variation in *S. confusus* is, apart from point of origin of peduncles, largely confined to corolla size and colouring. The majority of populations seen throughout the distribution range have small flowers less than 23 mm. long. Colour ranges from white to pale violet, often with a pale yellow blotch in the throat, but without other markings. Along the Lilani road, however, flowers are larger (28—30 mm. long), deep violet-blue in colour with a bright yellow throat blotch, and the corolla lobes tend to be suborbicular rather than oblong as in all other populations. Several more or less discrete populations can be seen in the local forest patches, and they are morphologically constant. But they differ so strikingly in corolla size, colour, and shape of lobes from all other known populations of the species that it is suspected that they have been contaminated by gene exchange with local populations of *S. polyanthus* ssp. *verecundus*.

S. confusus may hybridise naturally when growing with other species. Hybrids are occasional where *S. confusus* and *S. grandis* are sympatric in the environs of Ngome forest. But where human activity has created disturbed

habitats, hybrid swarms have become established. These are discussed under *S. haygarthii*.

An interesting taxon is known to occur in Pongola Poort and other kloofs in the Lebombo mountains (*Ubombo dist.*, Jozini Dam, *Strey* 5311, NH). This taxon has flowers up to 50 mm. long and sometimes develops bilobed stigmas, but otherwise appears to be indistinguishable from typical *S. confusus*. Its taxonomic status cannot be determined until it has been investigated in the field.

7. *S. haygarthii* N.E.Br. ex C.B.Cl. in Dyer, Fl. Cap. 4 (2) : 440 (1904).

NATAL: Zululand, Isibundini, *Haygarth* sn. (herb. *Medley Wood* 7465) K, LECTOTYPE. (*Haygarth* sn, NH, is *S. grandis* N.E.Br., the two species having been collected simultaneously by Haygarth, which led C. B. Clarke (1904) to describe the leaf of *S. grandis* as that of *S. haygarthii* (N. E. Brown, 1905)). Clarke (1904) did not designate a holotype, but all his cited specimens have been examined, and all but *Mudd* sn, Umzeila, Transvaal, are *S. haygarthii*).

S. reynoldsii Verdoorn in Fl. Pl. S. Afr. 21, t. 804 (1941)*; B. L. Burt in R.H.S. Dict. Gard. ed. 2, 4 : 2045 (1956). **Nkandla dist.**, Nkandla, 16 mls. S. of, *Reynolds* 3229, PRE, HOLOTYPE.

S. angustilobus N.E.Br. nomen, J. M. Wood in Trans. S. Afr. Phil. Soc. 18 (2) : 202 (1908), nomen.

Monocarpic. *Leaf* 1, up to 300 × 450 mm., often much smaller, upper surface dark green, lower often purplish-red. *Inflorescence* c. 36-flowered. *Peduncle* up to 365 mm. long, brownish green, sparsely pilose with glandular and eglandular hairs. *Bracts* elliptic to lanceolate, up to 10 × 2 mm., green to brown, pilose. *Flower* up to 45 mm. long. *Pedicel* 10–12 mm. long, elongating in fruit, greenish-brown, pilose with glandular and eglandular hairs. *Calyx* lobes linear to lanceolate, 3 × 1 mm., green to brown, pilose, sometimes with glandular hairs. *Corolla* tube 8–20 mm. long, white to pale violet, glandular-pilose, base c. 3 mm. in diam.; upper lobes divergent to divaricate, oblong to obovate, 8–10 × 4–6 mm. at apex; lower lip 8–29 mm. long, lobes directed downwards and outwards giving a “waisted” effect to the limb, lobes oblong to obovate, 7–9 × 3·5–6 mm.; all lobes white to pale violet, glandular inside, glandular or glabrous outside, lower lip marked with impressed lines, sometimes with violet streaks or blotches; throat white or pale yellow, mouth sometimes suffused violet. *Stamens*: filaments 1·5–3 mm. long, white, sparsely glandular; anther lobes 1 mm. long, white; staminodes minute. *Ovary* 4·5–7 mm. long, green, appressed pubescent; style 1·5–2·5 mm. long, white, pubescent with glandular and eglandular hairs; stigma subcapitate. *Capsule* 25–84 (56 ± 7) mm. long, 1·5 mm. in diam.

Flowering period: Sept. to April.

NATAL: **Bergville dist.**, Oliviershoek Pass, 1676 m., *Hilliard* 851, E, K, NU, PRE; farm "The Cavern", 1219 m., *Hilliard* 850, E, NU; Oliviershoek Pass, c. 1500 m., *Thode* 3984, 3985, STE; Mont Aux Sources, *McLean and Bayer* 128, K. **Helpmekaar dist.**, road to Elandsdraal, 1433 m., *Hilliard* 1864, NU. **Nkandla dist.**, Nkandla, 12 mls. S. of, *Reynolds* 3227, PRE; Nkandla forest, 1158 m., *Codd* 6976, PRE; -do- 1219 m., *Hilliard* 829, E, K, NH, NU; -do- Isibundini, 1036 m., *Hilliard* 815, NU; -do- Nomangci, *Hilliard* 816, E, K, NU, PRE; Qudeni, 1830 m., legit. *Davies* 40, *Wood* 7932, K, NH; -do- *Dyer and Collett* 4701, PRE; -do-, 1646 m., *Hilliard* 830, E, K, NU. **Umvoti dist.**, road to Lilani, 930 m., *Hilliard* 835, E, NU, *Hilliard* 1960, K, NH, NU. **Kranskop dist.**, forest patch on Middledrift road near Kranskop, 1128 m., *Hilliard* 833, E, K, NU, PRE, 920, K, NU. **Eshowe dist.**, Ngotshe forest, 610 m., *Hilliard* 1173, E, NU. **Mapumulo dist.**, Fort Cross, 1050 m., *Hilliard* 927, K, NU; near Mapumulo village, 830 m., *Hilliard* 836, E, K, NBG, NH, NU, PRE; 7 mls. Mapumulo on Kranskop road, 1036 m., *Edwards* 3069, NU. **Richmond dist.**, near Richmond, farm "Thedden", 762 m., *Hilliard* 819, NU; Hella-Hella, 960 m., *Hilliard* 1033, NU. **Camperdown dist.**, near Shongweni Station, 427 m., *Hilliard* 820, E, NU; McIntosh Falls on Mhlatusana river, 563 m., *Hilliard* 818, E, NU. **Ixopo dist.**, near Highflats, 823 m., *Hilliard* 1143, E, K, NU, PRE; near Highflats, Mtwalume Falls, 884 m., *Hilliard* 1144, NU, K, PRE; do., *Strey* sn, NU. **Umzinto dist.**, Kenterton, Ifafa Valley, c. 600 m, *Thode* 4346, STE; c. 1 ml. Braemar, 500 m., *Hilliard* 1145, E, K, NU; Dumisa, *Rudatis* 1288, BM, K. **Alfred dist.**, near Harding, farm "Rooivaal", Xambu river, 700 m., *Hilliard* 1361, E, K, NH, NU, PRE; Shennington, c. 3 mls. NNE Gun Drift, c. 760 m., *Acocks* 12238, PRE; Weza, Mpetyne forest, 1158 m., *Hilliard* 2535, E, K, NH, NU, PRE. **Port Shepstone dist.**, Murchison Plains Black Wattle Co., Izotsha river, 300 m., *Hilliard* 870, E, NU, PRE; Beach Terminus, banks of Izotsha river, 30 m., *Thode* 3982, STE; Oribi Gorge, c. 300 m., *Hilliard* 924, E, NU, 997, 2134, NU; c. 8 mls. Port Edward on Izingolweni road, *Getliffe* sn, NU; sine loc., *Robinson* sn, K, *Sanderson* sn, K.

CAPE: **Tabankulu dist.**, Tabankulu forest, 1219 m., *Hilliard* 2496, NU. **Bizana dist.**, c. 5 mls. Bizana on Flagstaff rd., 1067 m., *Hilliard* 1120, E, K, NU, PRE; between Bizana and Lusikisiki, *West* sn, PRE. **Port St. Johns dist.**, Port St. Johns, Eagles Nest, 170—200 m., *Britten* 6602, PRE, *Codd* 9754, PRE, *Hilliard* 1062, E, K, NU, PRE.

S. haygarthii is extremely variable, particularly in flower size, in corolla colour and markings, and in shape of corolla lobes. There is such marked variation in corolla size and colouring that extremes could easily be mistaken

for distinct species. Of the populations so far seen scarcely two are alike. In fact it is sometimes possible to assign specimens precisely to the forest or at least the area from which they came. The one constant feature in corolla form is the "waisted" limb. A number of populations have been sampled and in each this "waist" can be detected, although it is less marked in the southern populations (Fig. 7). Other constant characters are the solitary leaf and the long, relatively slender capsule.

To attempt to split this complex into infraspecific categories would merely create confusion, and *S. haygarthii* is therefore treated as a single variable species. There is in fact no discontinuity in corolla size. Fig. 8 demonstrates the continuous variation in size of corolla limb in thirteen populations. Colour variation in the same populations is listed in Table 1.

S. reynoldsii Verdoorn is reduced to synonymy because the two types from the same locality are indistinguishable.

Causes of variation in *S. haygarthii* cannot be elucidated until a complete biosystematic investigation is undertaken. It is possible that *S. haygarthii* is of hybrid origin and it is suggested that interspecific gene exchange followed by isolation has contributed to variation patterns. Several populations of *S. haygarthii* indicate possible gene exchange with other species still growing in the same area. Suspected gene exchange between *S. polyanthus* ssp. *polyanthus* and *S. haygarthii* in Oriibi Gorge has already been mentioned. But a situation similar to that at Kingscliffe (p. 107) has arisen in the forested gorge of the Karkloof river on the farm "The Start", where a uniform, sexually reproducing population displays the characteristics of more than one species (Hilliard 1006, E, NU).

Anomalous population on "The Start".

Monocarpic. *Leaf* up to 24×20 mm., upper surface medium green, lower paler, often suffused purplish-red on veins. *Inflorescence* many flowers expanded simultaneously. *Peduncle* up to 200 mm. long, green, sparsely pilose. *Bracts* linear, 6×1 mm., green, pilose. *Flower* 35×40 mm. long. *Pedice* c. 7 mm. long, elongating slightly in fruit, green, pilose. *Calyx* 5-partite, lobes linear-lanceolate, 6×1 mm., green, pilose. *Corolla* tube c. 18 mm. long, base 3 mm. in diam., pale violet adaxially, whitish abaxially, pilose without, minutely glandular within; limb waisted; upper lobes divergent, obovate, c. 13×8 mm.; lower lip 15–20 mm. long, lobes elliptic to suborbicular, $10\text{--}13 \times 9\text{--}10$ mm.; all lobes medium violet, glandular-pubescent inside, almost white, pubescent outside, yellow blotch in throat. *Stamens*: filaments 4 mm. long, white, sparsely pilose basally, minutely glandular apically; anther lobes 1 mm. long, violet; staminodes minute, violet. *Ovary* 6 mm. long, green, pubescent; style 2 mm. long, green, pubescent; stigma conical. *Capsule* 33–63 (46 ± 7) mm. long, c. 1.5 mm. diam.

The plants resemble *S. haygarthii* in the solitary leaf, the tall, many-flowered inflorescence, and the shape of the corolla limb. But the colour and texture of the corolla is that of *S. polyanthus*. The mean capsule length is shorter than that of *S. haygarthii*, longer and more slender than that of *S. polyanthus* ssp. *verecundus*.

S. haygarthii and *S. polyanthus* are partially sympatric in their distribution range. *S. polyanthus* ssp. *verecundus* has been recorded from several localities near "The Start". It is highly probable that the population on "The Start" is of hybrid origin, although it has become stabilised as a true-breeding entity.

A different situation may, however, arise where *S. haygarthii* is sympatric with another species having different ecological requirements, and where human interference has created an intermediate environment. Hybrid swarms may then occur. Examples are roadside banks on the farm road below Qudeni range and below Isibundini store, Nkandla forest, where *S. haygarthii* and *S. polyanthus* ssp. *verecundus* are the putative parents.

A good example of natural hybridisation is afforded by the *Streptocarpus* populations along the road to Lilani. Access to Lilani is provided by a steep, narrow river valley descending to the Umvoti river. The main valley wall is dissected by numerous streamlets. The road thus passes through a succession of patches of streambank forest separated by grassy shoulders. *S. haygarthii* is found in the forest patches, *S. confusus* on drier but shaded roadside banks or in forest patches that have been trampled out by cattle and goats. *S. polyanthus* ssp. *verecundus* favours the rockier, more exposed roadside banks. Hybridisation occurs freely between *S. confusus* and *S. polyanthus* ssp. *verecundus* and between *S. confusus* and *S. haygarthii*.

The three taxa are readily distinguished by a number of morphological characters, the most striking of which are detailed below. *S. haygarthii* and *S. confusus* have tall, many-flowered inflorescences, while those of *S. polyanthus* ssp. *verecundus* are short and few-flowered. In *S. confusus*, the primary peduncle arises from the apex of the hypocotyl and curls up through the leaf sinus, while in the other two taxa it arises from the upper surface of the leaf. The shape of the limb is different in all three taxa. It is "waisted" in *S. haygarthii*, rounded in *S. polyanthus* ssp. *verecundus*, and oblong in *S. confusus* because of the markedly divaricate upper lobes. Corolla colour and markings are different too; in *S. haygarthii*, the corolla is almost white to very pale violet, sometimes with a yellow blotch in the throat, occasionally with dark violet streaking on the lower lip. The corolla tube is glandular-pilose with occasional acute hairs. The corolla limb of *S. confusus* is rich violet-blue, with a darker violet blotch at the base of the lower lip enhanced by a bright yellow transverse bar in the throat of the tube. The indumentum on the corolla tube is similar to that in *S. haygarthii*. The corolla limb of *S. polyanthus* ssp. *verecundus* is uniform

pale to medium violet with no dark lines or blotches, but with a yellow blotch in the throat. The corolla tube is pilose and eglandular. The capsule of *S. confusus* is shorter and stouter than that of *S. haygarthii*, but not as short as that of *S. polyanthus* ssp. *verecundus*.

Bearing these characters in mind, it is easy to detect hybrids, particularly as they occupy only habitats intermediate between those favoured by their putative parents. For example, the peduncle character and rich colouring of *S. confusus* may be evident, combined with the "waisted" limb of *S. haygarthii* (Hilliard 3063, NU). In the obvious *S. confusus*, *S. polyanthus* ssp. *verecundus* crosses, the shape, colour and markings of the corolla limb, the corolla tube indumentum, and capsule length are intermediate between those of the parents, and the peduncle character of *S. confusus* may or may not appear. But all possible gradations between the putative parents can be seen in both species crosses.

Much the same situation arises where the road from Kranskop to Middle-drift on the Tugela river traverses forest succeeded by a roadside bank, unsheltered except by aspect. *S. haygarthii* is abundant on the steeply sloping forest floor and on roadside banks in the forest. *S. polyanthus* ssp. *verecundus* is found largely on the unsheltered roadside bank. Not only do the two taxa have different habitat preferences, they also differ in a number of contrasting morphological characters which can be summarised briefly. *S. haygarthii*: *leaf* indumentum patent, upper surface appears dark green (A1), *inflorescence* tall, branched, many-flowered (B1), *corolla* limb "waisted" (C1), varying from white to medium violet with dark marks at base of lower lip (D1), no yellow in throat (E1), *capsule* long, generally 55 mm. or more (F1). *S. polyanthus* ssp. *verecundus*: *leaf* indumentum appressed, upper surface appears grey-green (A3), *inflorescence* short, unbranched, few-flowered (B3), *corolla* limb rounded (C3), uniform pale violet with no dark markings on lower lip (D3), yellow in throat (E3), *capsule* short, generally less than 40 mm. (F3). Characters intermediate between those of the putative parents are given a value of 2.

If the characters are scored as indicated, selected specimens give the following results:

	A	B	C	D	E	F
Hilliard 3072 (E, NU)	1	1	1	1	1	1
Hilliard 3073 (E, NU)	1	2	1	1	1	2
Hilliard 3074 (E, NU)	1	2	2	2	3	2
Hilliard 3075 (E, NU)	3	3	2	1	3	2
Hilliard 3076 (E, NU)	3	3	3	3	3	3

It is clear that 3072 is typical *haygarthii*, 3076 is typical *polyanthus* ssp. *verecundus*, 3073, 3074, 3075 are obviously intermediate between the two. Such intermediates, showing varying degrees of *haygarthii* and *polyanthus* ssp. *verecundus* influence, are frequent in the transitional zone between forest and relatively unsheltered bank.

Conclusion

S. polyanthus and its allies form a morphologically distinct group showing scant inter-relationship with any other alliance in Southern Africa, except perhaps *S. johannis* and *S. baudertii*, whose flowers bear a superficial resemblance to those of *S. polyanthus*.

S. polyanthus and *S. prolixus*, *S. daviesii* and *S. silvaticus*, and *S. haygarthii* and *S. confusus* constitute closely related species pairs, while *S. pentherianus* remains relatively isolated.

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